

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

---

COPEPODA PARASITIC ON AUSTRALIAN FISHES,  
XI. *IMPEXUS HAMONDI*  
NEW GENUS, NEW SPECIES WITH A KEY TO THE  
GENERA OF LERNAEOCERIDAE

BY Z. KABATA

*Fisheries Research Board of Canada Biological Station,  
Nanaimo, British Columbia, Canada*

The parasitic copepods belonging to the family Lernaeoceridae, commonly found on fishes in many parts of the world's oceans, are conspicuously scarce in Australian waters. The author's collection contains no representatives of this family. Apparently, the only records of the lernaeocerids from Australia are those made by Heegaard (1962). He recorded *Lernaeenicus hemirhamphi* Kirtisinghe, 1933, from the eye of *Hemirhamphus intermedius* taken in St. Vincent Gulf, South Australia, and *Lernaeolophus sultanus* Heller, 1865, from the lower lip of *Tetraodon* sp. taken off Lord Howe Island, to the east of New South Wales.

It is, therefore, with great interest that the author examined a small lernaeocerid sent to him from New South Wales by Dr. Richard Hamond. The parasite was attached to the left flank of *Parvicrepis parvipinnis*, the anterior end of its trunk partially covered by the pelvic fin of the host (Fig. 1). The host was only 19.4 mm long and the dissection of the parasite, deeply embedded in its visceral cavity, proved extremely difficult. It was not accomplished without severing the parasite's trunk from its anterior part at the point of its penetration of the body wall.

Establishment of a new taxon on a single, damaged specimen is not to be undertaken lightly. In this instance, however, the parasite clearly belonged to none of the known genera of

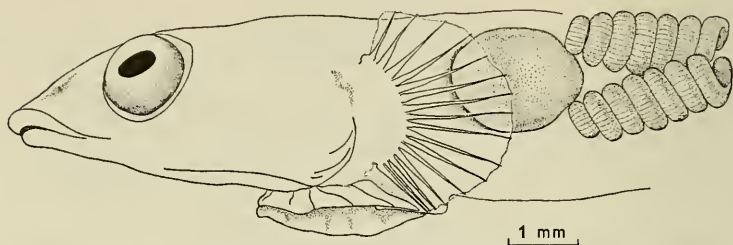


FIG. 1. Anterior part of *Parvicrepis parvipinnis*, showing trunk of *Impexus hamondi* protruding from its left flank.

Lernaeoceridae. It became necessary to erect a new genus to accommodate it in the family, to which it indubitably belongs. The small size and the fragility of the specimen made the description and even finding of the appendages impossible. The diagnosis, therefore, was based entirely on the distinctive gross morphology of the parasite.

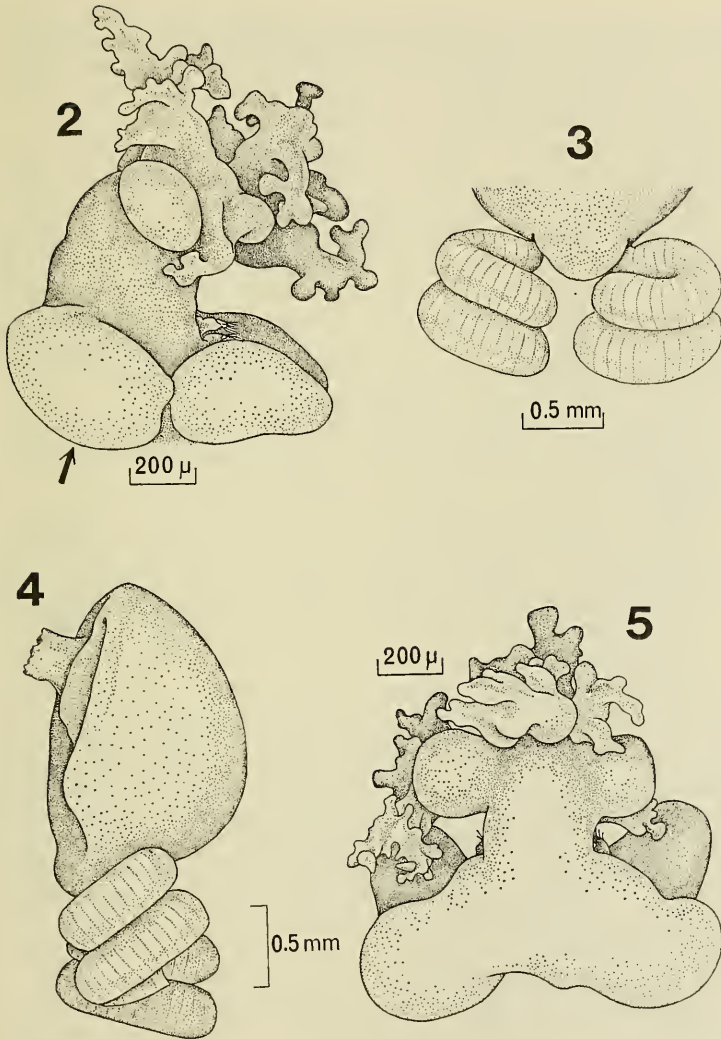
***Impexus hamondi* new genus, new species**

*Host:* *Parvicrepis parvipinnis* (Waite, 1906)

*Habitat:* Embedded in visceral cavity, trunk protruding from left flank of host.

*Locality:* Low water mark in the surf zone, on the northeast corner of the Long Reef, Collaroy (north of Sydney), New South Wales. Taken by Dr. R. Hamond on 25 August 1968. The specimen becomes the holotype of the species and is deposited in the National Museum of Natural Sciences, Ottawa, Cat. No. NMC 15315.

*Description of female:* The main feature of the cephalothorax (Figs. 2 and 5) is the presence of three pairs of ovoid tubercles. Four of them are of about the same size and are arranged at the same level, one pair being the dorsolateral and the other ventrolateral outgrowths of the cephalothorax. (The only appendages observed, a pair of thoracopods, is located immediately distal to the ventrolateral tubercles (Fig. 2)). Distal to the two pairs of tubercles is a short, cylindrical, necklike tube, connecting them with the third pair of tubercles, clearly seen in Figures 2 and 5. Directly in front of the anterior pair of tubercles the cephalothorax breaks up into numerous processes, branching in an irregular and complicated manner and forming a formidable holdfast. These processes are covered over and bound together by the connective tissue capsule produced by the host and are virtually impossible to dissect out. Parts of the holdfast were broken off in the course of dissection, particularly on the right side of the parasite (as can be seen in Figure 5).



FIGS. 2-5. *Impexus hamondi* new species. 2. Cephalothorax, lateral (arrow points to location of severed neck); 3. Posterior extremity, dorsal; 4. Trunk, lateral; 5. Cephalothorax, dorsal.

The mouth and the buccal appendages are present on the ventral surface of the cephalothorax at the level of the anterior pair of tubercles. The region is densely surrounded by the branches of the holdfast and cannot be explored without complete destruction of the specimen. The number of pairs of thoracopods was also impossible to determine.

The four posterior tubercles and the trunk are linked by a short, cylindrical neck, about as long as that linking the anterior and posterior tubercles and about a half of its diameter. It is this part (Fig. 4) that was severed during dissection. The position of the neck on the trunk is subterminal and the neck itself is at almost right angles to the long axis of the trunk. The trunk (Figs. 3 and 4) is oval in dorsal aspect. Its dorsum is convex and the ventral surface almost flat (Fig. 4). The posterior extremity (Fig. 3) is rounded and protrudes slightly beyond the points of attachment of the egg-sacs. No caudal furca was observed. There are also no processes or outgrowths on the trunk.

The egg-sacs are tightly coiled. In the specimen examined each egg-sac had seven coils, the left sac coiling clockwise and the right anti-clockwise.

The dimensions of the specimen are as follows:

Cephalothorax length .....	0.90 mm
Cephalothorax width at level of anterior tubercles .....	0.78 mm
Cephalothorax width at level of posterior tubercles .....	1.00 mm
Trunk length .....	1.96 mm
Trunk width .....	1.52 mm
Distance of neck from anterior margin of trunk .....	0.50 mm

*Discussion:* The generic affinity of a lernaocerid species can usually be determined by three characters: the shape of the body (distinction being made between trunks of sigmoid and cylindrical shapes); presence or absence of profusely branching holdfast and the nature of the egg-sacs. There are three types of egg-sacs in the family Lernaoceridae: simple, long and straight sacs (e.g. in *Lernacenicus*), sacs looped irregularly around a central axial rod, to which they are held by a mesenterylike membrane (e.g. *Lernacocera*) and coiled sacs (e.g. in *Haemobaphes*). Different combinations of these three characters occur in each genus, but within the generic boundaries these combinations are constant.

It appeared to the author that the best way to determine the generic affiliation of the examined lernaocerid was a key, based on the above three characters (with addition of others, if necessary). Such key would allow the identification of all known lernaocerid genera (with the exception of *Thanatodectes* Leigh-Sharpe, based on a single, decapitated specimen). The key is given below.

#### KEY TO GENERA OF LERNAOCERIDAE

- |                        |   |
|------------------------|---|
| 1. Body sigmoid .....  | 2 |
| Body not sigmoid ..... | 6 |

- |  |                       |
|--|-----------------------|
| 2. Egg-sacs spirally coiled .....  | 3                     |
| Egg-sacs coiled round axial rod .....  | <i>Lernaeocera</i>    |
| 3. Posterior part of body covered with brushlike outgrowths .....  |                       |
| .....  | <i>Lernaeolophus</i>  |
| Posterior part of body without brushlike outgrowths .....  | 4                     |
| 4. Neck long, with lateral outgrowths .....  | <i>Haemobaphes</i>    |
| Neck long, without outgrowths .....  | 5                     |
| 5. First three pairs of thoracopods biramous, fourth uniramous .....   |                       |
| .....  | <i>Trifur</i>         |
| All four pairs of legs uniramous .....   | <i>Allotrifur</i>     |
| 6. Egg-sacs spirally coiled .....  | 7                     |
| Egg-sacs long and straight .....   | 9                     |
| 7. Body cylindrical, neck in line with trunk .....   | 8                     |
| Body ovoid, with flat ventral and convex dorsal surfaces, neck at an angle with trunk, subterminal .....           | <i>Impexus</i>        |
| 8. Neck smooth, or with one or two pairs of lateral processes; branching horns at anterior end of cephalothorax .. | <i>Phrixocephalus</i> |
| Anterior half of neck covered by branching outgrowths; cephalothorax ellipsoidal, with two pairs of lobes .....    | <i>Creopelates</i>    |
| 9. Body very long, cylindrical, with brushlike outgrowths at posterior extremity .....                             | <i>Pennella</i>       |
| Body with two long posterior processes .....   | <i>Peniculisa</i>     |
| Body cylindrical, without any outgrowths or processes .....  | 10                    |
| 10. Mouth and buccal appendages at tip of proboscis longer than rest of body .....                                 | <i>Ophiolernaea</i>   |
| Mouth at tip of short proboscis, or without proboscis .....  | 11                    |
| 11. Neck at about $\frac{1}{3}$ of trunk length, at angle with trunk ..  | <i>Peroderma</i>      |
| Neck terminal, in line with long axis of trunk .....   | 12                    |
| 12. Cephalothorax oval, usually without processes, sometimes with two lateral, short, branching processes .....    | <i>Peniculus</i>      |
| Cephalothorax anteriorly with a tuft of finely branched processes in one, sometimes two groups .....               | <i>Cardiodectes</i>   |
| Cephalothorax without anterior tuft of processes .....   | 13                    |
| 13. Body narrowing anteriorly to form neck of more or less uniform diameter .....                                  | <i>Lernaeenicus</i>   |
| Diameter of neck narrowest at its midlength, expanding both posteriorly and anteriorly .....                       | <i>Sarcotretes</i>    |

The above key points to the necessity of isolating the specimen examined by the author in a separate genus, to which the name *Impexus* was given. The genera which resemble *Impexus* most closely are *Phrixocephalus* Wilson and *Creopelates* Shiino. In addition to differences enumerated in the key under numbers 7 and 8, *Impexus* differs from *Phrixocephalus* in the level of cephalothorax which produces the profusely branching holdfast. In *Impexus* this holdfast constitutes the most anterior part of the body; in *Phrixocephalus* it is posterior to the cephalic lobes (see

Kabata, 1967). In *Impexus*, therefore, it is the preoral segments and in *Phrixocephalus* postoral segments that are responsible for the formation of the holdfast. The differences between *Impexus* and *Creopelatus* are manifest in the nature of their holdfasts. The holdfast of *Creopelatus* is distributed around the neck, which it surrounds with short, bushy outgrowths. The anterior end of the cephalothorax, the "head," is an oval structure provided with two pairs of irregular lobes.

*Impexus* is, then, clearly distinguishable from all other genera with coiled egg-sacs. It should be mentioned, however, that the description of *Cardiodectes rotundicaudatus* by Izawa (1970) makes the matter more complicated by introducing some possibility of affinities between *Impexus* and species with noncoiled egg-sacs. Izawa's species, in all other respects identifiable as *Cardiodectes* with the aid of the key proposed above, differs from its congeners in the possession of coiled egg-sacs. The coils are not a typical tight spiral but are loose and have relatively large diameter. To the author's knowledge, this species constitutes the only exception to the rule that the members of the same lernaeocerid genus always have the same type of egg-sac. *Impexus hamondi* can be distinguished from all the species of *Cardiodectes* by the shape of its trunk (always cylindrical in *Cardiodectes* and with terminal neck). The author believes that it should be recognized as a distinct genus. The matter, however, should be kept in mind in further studies of Lernaeoceridae.

## LITERATURE CITED

- HEEGAARD, P. 1962. Parasitic Copepoda from Australian waters. Rec. Austr. Mus. 25:149-234.
- IZAWA, K. 1970. A parasitic copepod, *Cardiodectes rotundicaudatus* n. sp., (Caligoida:Lernaeidae) obtained from a deep-sea goby in Japan. Annot. zool. Jap. 43:219-224.
- KABATA, Z. 1967. Morphology of *Phrixocephalus cincinnatus* Wilson, 1908 (Copepoda:Lernaeoceridae). J. Fish. Res. Bd. Can. 24: 515-526.